A.D. 1864, 10*th* NOVEMBER. N° 2788.

SPECIFICATION

OF

JAMES ALEXANDER MANNING.

COLLECTING AND TREATING NIGHT SOIL.

LONDON:
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A.D. 1864, 10th *November.* N° 2788.

Collecting and Treating Night Soil.

LETTERS PATENT to James Alexander Manning, of the Inner Temple, London, Esquire, for the Invention of "IMPROVEMENTS IN THE COLLECTION AND TREATMENT OF NIGHT SOIL."

Sealed the 5th May 1865, and dated the 10th November 1864.

PROVISIONAL SPECIFICATION left by the said James Alexander Manning at the Office of the Commissioners of Patents, with his Petition, on the 10th November 1864.

I, JAMES ALEXANDER MANNING, of the Inner Temple, London, Esquire, do hereby declare the nature of the said Invention for "IMPROVEMENTS IN THE COLLECTION AND TREATMENT OF NIGHT SOIL," to be as follows:—

This Invention relates to improvements on the Inventions for which Letters Patent were granted to me respectively on or about the 3rd of May 1861, No. 1115, and the 4th of February 1863, No. 321, and consists of an improved mode or method of collecting and treating night soil and converting it into manure without creating a nuisance whilst carrying on the process to which it is subjected, and without losing any of the elements or fertilizing properties of the mixed, solid, and fluid human excreta which are useful to agriculture.

In carrying out this Invention it is necessary that the cess-pits or other receptacles for human excreta should be cemented or rendered water-tight, so that neither rain water nor waste fluids should be able to drain into them, nor the urine to escape therefrom.

Manning's Improvements in the Collection and Treatment of Night Soil.

In collecting the human excreta from these cess-pits, I prefer that the operation shall be performed by the application of a hose or pipe to the pit, the hose being connected with a close-covered cart or moveable air-tight vessel of cast iron or other material for the conveyance of the excreta to the manure works, such carts having affixed to them exhausting pumps by which the cess-pits may be emptied in the course of a few minutes without creating that offensive odour which invariably occurs when night soil is removed in the usual manner.

When the cess-pit is emptied I strew over the bottom a sufficient quantity of equal weights of dry seaweed and sulphuric acid in which the dry sea weed has been dissolved, the quantity used depending upon the dimensions of the pit, but in all cases bearing reference to the per-centage of ammonia in the ton of excreta, from 25 lbs. to 30 lbs. of sulphuric acid with an equal quantity of the dry seaweed being necessary to the ton of excreta which averages one per cent. of ammonia, and more of the acid in due proportion if a larger per-centage of ammonia exists in the 2240 lbs., or one ton of human excreta, the acid fixing the ammonia, whilst the seaweed charcoal deodorizing the ordure, or, if preferred, superphosphate of lime may be used in lieu of the acid and seaweed charcoal.

The excreta having been pumped into the cart is conveyed to the factory, where on a raised ground there is erected a covered tank of sufficient dimensions to hold the average night supply of the town or locality into which the soil is discharged by a pipe or otherwise; but if the factory be on the banks of a river or canal, in such case the soil or excreta is brought to it in barges; then it is pumped up into the tank. The soil being collected in the tank may, by the opening of a valve at the bottom or lower portion of the tank, be allowed to flow by gravitation through a conduit or pipe (fixed at a proper declension) to the evaporating pans, which are made of wrought iron of such dimensions and diameter as will present the largest possible surface for the acceleration of the process of evaporation, the furnaces underneath the pans carrying nothing into the chimney shaft but the smoke of the coal consumed during the operation.

The evaporating pans I prefer are 12 feet in diameter by from 18 inches to 2 feet in depth, and perfectly air-tight; the interiors of these pans are furnished with agitators for stirring the liquid and allowing the vapor to pass off more rapidly. From the centre of the cover of each evaporating pan rises a perpendicular pipe or shaft communicating with a horizontal cylinder similar to the hydraulic main of gasworks, which cylinder receives the vapours arising from the mixed, solid, and fluid excreta whilst subjected to an elevated

temperature. These vapours are drawn from the cylinder into a straight pipe (passing a bend at its extremity) by means of a fanner situate at the bottom of the pipe, which fanner revolves with great rapidity through the agency of steam power, and forces the vapours into a condenser or absorber.

The condenser or absorber consists of a wrought-iron perpendicular cylinder (or it might be made of brick cemented with earth) resting on the ground, the upper part of which is furnished with a sufficient number of jets for conveying water into it in such direction and with such force that their various streams will meet or come into collision with each other in the centre of the condenser, whence a shower of fine rain will descend, and be disseminated over and through the whole interior space below the line of jets, absorbing all the gases which are brought over from the evaporating pans, which gases pass from the condenser by an exit or discharge pipe at the bottom, and are conveyed perfectly free from smell into the earth or into a water tank at such a depth in the earth as may be advisable, or into canals or any other channel of safety.

When the liquid of the mixed solid and fluid excreta is nearly evaporated, or the bulk is greatly reduced, but whilst still in a state of fluidity after boiling two or three hours, the contents of the evaporating pans are draw off by taps opening into one or more drying rooms, and are spread thinly over the floors thereof, where they are speedily deprived of their remaining moisture, the floors of the drying rooms being heated by the waste heat from the furnaces or by steam if preferred. The vapours still rising from the manure whilst drying are drawn off into another and separate condensor or absorber similar to that before described, except as regards the top or cover thereof, which, instead of being hermetically closed, with a manhole in the centre, has the cover of the manhole entirely removed, so as to allow a free passage for the air which is drawn into the condenser from the drying room, and which from the necessity existing for opening the doors occasionally to withdraw the dried manure admits its full compliment of atmospheric air, which must all be subsequently drawn off by the action of the fanner into the condensor, causing a pressure, which if unrelieved would greatly retard the progress of the operation. To remedy this, the cover of the manhole is removed, and the air which passes through the shower of water has a free passage into a globe or cylinder of copper, tin, or any light or thin metal where it can circulate freely until it passes from the cylinder into a short air shaft, in which are placed at distances of a foot or two from each other, trays or sieves of copper wire netting each charged to the depth of two or three inches with pieces of box-wood charcoal broken to about the size of horse beans, and furnished with a

wire netting cover to prevent the disturbance of the charcoal by any sudden rush of air. The object of the charcoal trays is to prevent the mephetic gases, which might escape absorption by the shower of water in the condenser and rush into the cylinder with the air, from escaping into the atmosphere, as they would then be taken up and be retained by the charcoal which will permit anything but pure air to pass through its pores. The same arrangement may also be applied, if found desirable, to the condensers attached to the evaporating pans.

When the manure arrives at the stage of dryness, it is removed or drawn into the rooms for manipulation through a covered way which has no communication with the external atmosphere, even the stove room door being kept closed except for the entrance of the workmen, and when the manure is sufficiently cool it is passed through a disintegrating machine, and reduced to a state of powder for the market. If desired, the manure may be dried by the aid of any well known or other centrifugal machine suitable for the purpose.

SPECIFICATION in pursuance of the conditions of the Letters Patent, filed by the said James Alexander Manning in the Great Seal Patent Office on the 10th May 1865.

TO ALL TO WHOM THESE PRESENTS SHALL COME, I, James Alexander Manning, of the Inner Temple, London, Esquire, send greeting.

WHEREAS Her most Excellent Majesty Queen Victoria, by Her Letters Patent, bearing date the Tenth day of November, in the year of our Lord One thousand eight hundred and sixty-four, in the twenty-eighth year of Her reign, did, for Herself, Her heirs and successors, give and grant unto me, the said James Alexander Manning, Her special license that I, the said James Alexander Manning, my executors, administrators, and assigns, or such others as I, the said James Alexander Manning, my executors, administrators, or assigns, should at any time agree with, and no others, from time to time and at all times thereafter during the term therein expressed, should and lawfully might make, use, exercise, and vend, within the United Kingdom of Great Britain and Ireland, the Channel Islands, and Isle of Man, an Invention for "Improvements in the Collection and Treatment of Night Soil," upon the condition (amongst others) that I, the said James Alexander Manning, by an instrument in writing under my hand and seal, should particularly

describe and ascertain the nature of the said Invention, and in what manner the same was to be performed, and cause the same to be filed in the Great Seal Patent Office within six calendar months next and immediately after the date of the said Letters Patent.

NOW KNOW YE, that I, the said James Alexander Manning, do hereby declare the nature of my said Invention, and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement, that is to say:—

My said Invention relates to improvements in the Inventions for which Letters Patent were granted to me respectively on or about the 3rd of May 1861, No. 1115, and the 4th of February 1863, No. 321, and consists of an improved mode or method of collecting and treating night soil and converting it into manure without creating a nuisance whilst carrying on the process to which it is subjected, and without losing any of the elements or fertilizing properties of the mixed solid and fluid human excreta which are useful to agriculture.

In carring out this Invention I prefer that the cess pits or other receptacles for human excreta should be cemented or rendered water-tight so that neither rain water nor waste fluids should be able to drain into them, nor the urine to escape therefrom.

In collecting the human excreta from these cess-pits I prefer that the operation shall be performed by the application of a hose or pipe to the pit, the hose being connected with a close-covered cart or moveable air-tight vessel of cast iron or other material for the conveyance of the excreta to the manure works, such carts having affixed to them exhausting pumps by which the cess-pits may be emptied in the course of a few minutes without creating that offensive odour which invariably occurs when night soil is removed in the usual manner.

When the cess-pit is emptied I strew over the bottom a sufficient quantity of a dry powder composed of equal weights of dry seaweed and sulphuric acid in which the dry seaweed has been dissolved, the quantity used depending upon the dimensions of the pit, but in all cases bearing reference to the per-centage of ammonia in the ton of excreta, from twenty-five pounds to thirty pounds of sulphuric acid with an equal quantity of the dry seaweed, that is, from fifty pounds to sixty pounds of the acid and seaweed combined being necessary to the ton of excreta which averages one per cent. of ammonia and more of the said compound in due proportion if a larger per-centage of ammonia exists in the two thousand two hundred and forty pounds or one ton of human excreta, the acid fixing the ammonia whilst the seaweed charcoal

deodorises the ordure, or, if preferred, superphosphate of lime may be used in lieu of the acid and seaweed charcoal.

The excreta having been pumped into the cart is conveyed to the factory, where on a raised mound or otherwise there is erected a covered tank of sufficient dimensions to hold the average night supply of the town or locality, into which the soil is discharged by a pipe or otherwise, but if the factory be on the banks of a river or canal, in such case the soil or excreta is brought to it in barges; then it is pumped up into the tank. The soil being collected in the tank may, by the opening of a valve at the bottom or lower portion of the tank, be allowed to flow by gravitation through a conduit or pipe (fixed at a proper inclination) to the evaporating pans, which are made of wrought iron or other metal or material of such dimensions and diameter as will present the largest possible surface for the acceleration of the process of evaporation, the furnaces underneath the pans carrying nothing into the chimney shaft but the smoke of the coal consumed during the operation.

The evaporating pans which I prefer to use are twelve feet in diameter or more by from eighteen inches to two feet in depth and perfectly air-tight; the interiors of these pans are furnished with agitators for stirring the liquid and allowing the vapour to pass off more rapidly, and if found useful in practice cold or hot air may be introduced into the pans from time to time to assist in driving the vapors and gases with greater force to their destination. From the centre of the cover of each evaporating pan rises a short perpendicular pipe or shaft communicating with a horizontal cylinder, which cylinder receives the vapours arising from the mixed solid and fluid excreta whilst subjected to an elevated temperature. These vapours are drawn from the cylinder into a pipe by means of a fanner situate at the bottom or end of the pipe, which fanner revolves with great rapidity through the agency of steam or other power, and forces the vapours into a condenser or absorber.

The condenser or absorber, which is connected with a powerful fanner, consists of a wrought or cast-iron perpendicular chamber (or it might be made of brick cemented) resting on a base of stone or brickwork of convenient height from the ground for carrying off the vapours and gases. In the interior of this condenser are a series of inclined overlapping trays of slate or other suitable material to receive the water which is supplied at the top of the condenser from a tank or otherwise, and to form an unbroken stream passing from one tray to the other from the top of the condenser to the bottom, the gases and vapours entering at the middle or other suitable part of the condenser. The number of inclined overlapping trays will depend upon practical experience in working, but under no circumstances should

there be less than eight, so that the gases may be thoroughly saturated before passing out of the condenser into the exit or discharge pipe; in this manner the vapours are condensed, and the gases being absorbed, the whole passes off free from smell into any convenient receptacle.

Where the works are in the vicinity of a river, lake, canal, or any running stream of water, then the vapours and gases held in combination therewith will be passed from the fanner through suitable pipes into a large tank or reservoir to be supplied continuously by such canal, river, or running stream, and to be erected in a suitable position convenient to the same.

The vapours and gases enter the tank by means of a pipe and bend, the end of the pipe dipping into the water tank a suitable distance where the vapours will be condensed and the gases will be entirely absorbed, the water in the tank flowing from the river, canal, or other source in at one end and out at the other, occasional agitation of the same being resorted to when the water supplied is stagnant as in canals, or the vapours may pass through coils of piping immersed in and open to the water in the said tank, or in some instances I may prefer driving the said gases direct into such canal, river, or running water.

When the liquid of the mixed, solid, and fluid excreta is nearly evaporated, or the bulk is greatly reduced, but whilst still in a state of fluidity after boiling from six to eight hours, the contents of the evaporating pans are drawn off by taps opening into one or more drying rooms, and spread themselves thinly over the floors thereof, where they are speedily deprived of their remaining moisture, the floors of the drying rooms being heated by the waste heat from the furnaces, or by flues, or by steam jackets if preferred. The vapours still rising from the manure whilst drying are drawn off into another and separate condenser or absorber similar to that before described, except that at the top of the condenser an air pipe is fitted to allow the passing off of the atmospheric air which is brought into the condenser in this process from the drying room as from the necessity existing for opening the doors occasionally in order to withdraw the dried manure. An entrance of atmospheric air takes place, which air must all be subsequently drawn off by the action of the fanner into the condenser, and thereby causes a pressure which, if unrelieved, would greatly retard the progress of the operation. The same arrangement may also be applied if found desirable to the condensers first named attached to the evaporating pan, herein-before described.

When the manure arrives at the stage of dryness it is removed or drawn into the rooms for manipulation through a covered way which has no communication with the external atmosphere, even the store-room door being kept

closed except for the extrance of the workmen, and when the manure is sufficiently cool it is passed through a disintegrating machine, and reduced to a state of powder for the market. If desired the manure may be dried by the aid of any well known or other centrifugal machine suitable for the purpose.

Having now described and particularly ascertained the nature of my said Invention, and the manner in which the same is or may be used or carried into effect, I would observe in conclusion, that what I consider to be novel and original, and therefore claim as the Invention secured to me by the herein-before in part recited Letters Patent, is,—

First, the general system or mode of collecting and treating night soil with a view to its manufacture into manure without the nuisance arising from the escape of noxious gases, substantially in the manner herein-before described.

Second, the prevention of the escape of noxious gases in the manufacture of manure from night soil by causing such gases to be absorbed by water, substantially as herein-before described.

In witness whereof, I, the said James Alexander Manning, have hereunto set my hand and seal, the Tenth day of May, in the year of our Lord One thousand eight hundred and sixty-five.

JAMES ALEX. MANNING. (L.S.)

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